Electronic Version
Stylesheet Version v1.1.1

Claims

[c1] 1. A system for tuning the wavelength of a laser beam emitted by a tunable laser, comprising:
a tunable etalon assembly including a Fabry-Perot ("FP") etalon and a thermal unit, wherein said FP etalon has paired reflectors to receive and wavelength filter the laser beam and said thermal unit thermally effects the separation of said paired reflectors in response to an etalon tuning signal;
a photodetector suitable to receive the laser beam after filtering by said FP etalon and generate a detected signal based on transmitted intensity; and
a controller suitable to:
generate said etalon tuning signal; and
receive said detected signal and generate a laser tuning signal based thereon, thereby facilitating controllably tuning the wavelength of the laser beam emitted by the tunable laser.

[c2] 2. The system of claim 1, wherein:
said FP etalon is an air-spaced type etalon having at least one spacer separating said paired reflectors; and
said thermal unit thermally changes the length of said at

least one spacer, thereby also changing the separation of said paired reflectors.

[c3] 3. The system of claim 1, wherein:
said FP etalon is a solid type etalon having glass separating said paired reflectors; and
said thermal unit thermally effects said glass, thereby changing the separation of said paired reflectors.

[c4] 4. The system of claim 1, wherein said thermal unit includes an electrical resistance heating element.

[c5] 5. The system of claim 1, wherein said thermal unit includes a thermal-electric cooler.

[c6] 6. The system of claim 1, wherein said controller is further suitable to controllably provide said etalon tuning signal such that said thermal unit maintains said FP etalon at or changes said FP etalon to a specific temperature, thereby setting said paired reflectors to a corresponding separation where the FP etalon has a corresponding resonant frequency.

[c7] 7. The system of claim 6, wherein:
said controller is further suitable to select a lock point with respect to the transmitted intensity of the laser beam detected by said photodetector; and
said controller is further suitable to controllably provide

said laser tuning signal such that the tunable laser emits the laser beam with a wavelength that results in the transmitted intensity coinciding with said lock point.

[c8] 8. The system of claim 7, wherein said controller is further suitable to servo lock said laser tuning signal in response to said detected signal, thereby permitting locking the laser beam at a specific wavelength by maintaining said FP etalon at a specific temperature or scanning the laser beam across a range of wavelengths by adjusting said FP etalon through a range of temperatures.

[c9] 9. The system of claim 1, wherein:
said tunable etalon assembly further includes a temperature sensor suitable to provide a temperature signal; and
said controller is further suitable to receive and employ said temperature signal when generating said etalon tuning signal.

[c10] 10. A system for determining how much the wavelength of a laser beam emitted by a tunable laser has been tuned, the system comprising:
a beamsplitter suitable to receive and split the laser beam into first and second beam portions;
a tunable etalon assembly including a first Fabry-Perot ("FP") etalon and a thermal unit, wherein said first FP etalon has paired reflectors to receive and wavelength

filter said first beam portion and said thermal unit thermally effects the separation of said paired reflectors in response to an etalon tuning signal;
a first photodetector suitable to receive said first beam portion after filtering and generate a first detected signal based on transmitted intensity;
a second FP etalon suitable to receive and wavelength filter said second beam portion;
a second photodetector suitable to receive said second beam portion after filtering and generate a second detected signal based on transmitted intensity;
a controller suitable to:
generate said etalon tuning signal;
receive said detected signal and generate a laser tuning signal based thereon, thereby facilitating controllably tuning the wavelength of the laser beam emitted by the tunable laser; and
receive said second detected signal and counts peak-valley cycles therein, thereby facilitating determination of how much the wavelength of the laser beam emitted by the tunable laser has been tuned.

[c11] 11. The system of claim 10, wherein:
said second FP etalon is part of a fixed space etalon assembly that includes a temperature sensor suitable to provide a temperature signal; and

said controller is further suitable to receive and employ said temperature signal when generating said etalon tuning signal.

[c12] 12. A system for determining the difference in wavelengths of a first laser beam emitted by a first tunable laser and a second laser beam emitted by a second laser, the system comprising:
a first beamsplitter suitable to receive and split the first laser beam into first and second beam portions;
a coupler suitable to alternately receive and redirect either of said second beam portion and the second laser beam as a tuning beam portion;
a first Fabry-Perot ("FP") etalon suitable to receive and wavelength filter said first beam portion;
a first photodetector suitable to receive said first beam portion after filtering and generate a first detected signal based on transmitted intensity;
a tunable etalon assembly including a tuning FP etalon and a thermal unit, wherein said tuning FP etalon has paired reflectors to receive and wavelength filter said tuning beam portion and said thermal unit thermally effects the separation of said paired reflectors in response to an etalon tuning signal;
a tuning photodetector suitable to receive said tuning beam portion after filtering and generate a tuning de-

tected signal based on transmitted intensity;

a controller suitable to:

receive said first detected signal and generate a first tuning signal based thereon to tune the first tunable laser to emit the first laser beam at a specific known wavelength;

control said first tuning signal to servo lock the first laser beam to said known wavelength;

generate said etalon tuning signal such that said tuning detected signal is at a known point on a peak-valley curve for said tuning FP etalon;

record a first value for said etalon tuning signal when said tuning beam portion comes from the first laser beam and said tuning detected signal is at said known point;

record a second value for said etalon tuning signal when said tuning beam portion comes from the second laser beam;

generate said etalon tuning signal such that said second value matches said first value, thereby tuning said tunable etalon across the difference in wavelengths of the first and second tunable lasers;

report on said first and second tuned values via an output link, thereby providing information about the difference said known wavelength emitted by said first tunable laser and the wavelength emitted by said second tunable

laser.

[c13] 13. The system of claim 12, the second laser is also tunable, and further comprising:
a second beamsplitter suitable to receive and split the second laser beam into third and fourth beam portions, wherein said third beam portion is received by the coupler:
a second FP etalon suitable to receive and wavelength filter said fourth beam portion;
a second photodetector suitable to receive said fourth beam portion after filtering and generate a second detected signal based on transmitted intensity; and
said controller further suitable to receive said second detected signal and controllably generate a second tuning signal based thereon to servo lock the second tunable laser to emit the second laser beam at a specific wavelength.